MAKSIMOVIC, Ljubomir, inz., visi strucni saradnik; RATKOVIC, Nada, inz., strucni saradnik; DUCIC, Vojislav, inz., strucni saradnik

Potential reactivity of the aggregate from Gaocici with cement alkalies. Saop Inst isp mat Srb 10 no.16:34-39 Mr '62

H

COUNTRY : YUGOSLAVIA
CATEGORY : Chemical Technology. Chemical Products and Their Applications. Ceramics. Binding Materials.*
ABS. JOUR. : RZhKhim., No 17, 1959, No. 61622

AUTHOR : Maksimovic, L.
INSTITUTE : -
TITLE : Testing of Plasticizer for Cement.

ORIG. PUB. : Saopst. Inst. ispitiv. mater. NRS, 1958, 6, No 8, 58-62

ABSTRACT : Testing of a new plasticizer for cement, obtained from the bi-products of cellulose manufacture by the sulfite method, is announced. It is indicated, that the mineralogical composition of cement affects considerably the action of the plasticizer.

*Concrete.

Card: 1/1

H - 48

COUNTRY : Yugoslavia
CATEGORY : H-13

ABS. JOUR. : RZKhim., No. 16 1959, No. 57925

AUTHOR : Muksimovic, M.
INST. : Not given
TITLE : Hydraulic Concretes and the Aggressiveness of the Aqueous Medium

ORIG. PUB. : Zat Mater, 6, No 7-8, 308-314 (1958)

ABSTRACT : The construction in Yugoslavia of large hydrotechnic installations from concrete requires the development of technical standards specifying methods for the protection of concrete from corrosion by leaching, sulfate-containing, carbonate-containing, and magnesial waters. In the absence of Yugoslav norms and standards covering these properties, the author proposes the adoption of the 'norms and standards for hydrotechnic concrete --characteristics and norms on the aggressiveness of aqueous media' used in the USSR.

S. Tipol't

CARD: 1/1

MAKSIMOVIC, LJ.

Local roads should be built by stabilizing the earth.

p. 92 (Put I Saobracaj) No. 1/3, Jan./Mar. 1957, Belgrade, Yugoslavia

SO: MONTHLY INDEX OF EAST EUROPEAN ACCESSIONS (EEAI) LC, VOL. 7, NO. 1, JAN. 1958

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700047-6

Prospects for building a Belgrade-Bar railroad. Medun transp 8 no.12:871-872 D '62.

Maksimovic, Dragi

H-34

YUGOSLAVIA/Chemical Technology, Chemical Products and Their Application, Part 4. - Dyeing and Chemical Treatment of Textile Materials.

Abs Jour: Referat. Zhurnal Khimiya, No 10, 1958, 34749.

Author : Dragi Maksimović,
Inst : ~~Not~~ given.
Title : Oil Emulsion for Jute Fiber.

Orig Pub: Tekstilna ind., 1957, 5, No 2, 41-44.

Abstract: The requirements put to the emulsion (E) used for processing jute fiber are discussed. Two methods of E preparation are described; according to one method, first a thick mass is prepared of the emulsifier and little amounts of oil and water, which is diluted with the remaining oil and water after that; according to

Card : 1/2

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700047-6

Q-1

YUGOSLAVIA / Farm Animals. General Problems.

Abs Jour: Ref Zhur-Biol., No 12, 1958, 54692.

Author : Vukavic Dusan V., Maksimovic Dusan.
Inst : Not given.
Title : Materials for the Determination of the Digestibility and Nutritiousness of Hay Made from Oak and Ash Leaves.

Orig Pub: Arhiv poljopr. nauke, 1956, 9, No 26, 59-76.

Abstract: The leafy feed provided by the ash tree and the various oak trees of Hercegovina was studied. It was found that the earlier the hay is made, the higher is the nutrient content of the leafy feed. Although the oak leaves contain a higher amount of raw protein, the leafy feed derived from the ash tree is more valuable since

Card 1/2

6

MAKSIMOVIC, Danica; SPALAJKOVIC, Mirjana

Pseudocroup as a problem in medical practice. Med. pregl. 18 no. 3:131-133 '65.

1. Otorinolaringoloska klinika Medicinskog fakulteta Univerziteta u Beogradu (Upravnik: Prof. dr. Srecko Podvinec).

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700047-6

CVETKOVIC, Stevan; MAKSIMOVIC, Danica

A case of rhinogenic meningitis cured by osteoplasty of the frontal sinus. Srpski arh. celok. lek. 91 no.4:437-440 Ap '63.

1. Otorinolaringoloska klinika Medicinskog fakulteta Univerziteta u Beogradu Upravnik: prof. dr Srecko Podvinec.
(MENINGITIS) (FRONTAL SINUS)
(SURGERY, OPERATIVE)

S

PAVLOVIC, Radmila; MAKSIMOVIC, Danica

Cancer of the external ear and the meatus. Srpski arh. celok. lek. 91 no.7:711-718 Jl-Ag'63

1. Otorinolaringoloska klinika Medicinskog fakulteta Univerziteta u Beogradu. Upravnik: prof.dr. Srecko Podvinec.

*

MAKSIMOVIC, D.

Better connections without shortening the road. Medun transp 9 no.12:810 D '6[illegible]

MAKSIMOVIC, D.

Influence of the mowing time and the drying method on the composition and feeding value of the hay of the plant community Nardetum strictae. Bul sc Youg 7 no.6:172 D '62.

1. Poljoprivredni fakultet Univerziteta, Sarajevo.

MAKSIMOVIC, D.

Productiveness of hemp-stalk growing.

P. 225 (TEKSTILNA INDUSTRIJA) (Beograd, Yugoslavia) Vol. 4, No. 6/7, June/July 1956

SO: Monthly Index of East European Accessions (EEAI) LC Vol. 7, No. 5, 1958

MAKSIMOVIC, Branislav, dr.; ARSENIC, Eva, dr.

Changes in the cervical spine in the course of rheumatoid arthritis. Reumatizam 12 no.4:134-137 '65.

1. Centralna Specijalisticka Poliklinika, Beograd.

MAKSIMOVIĆ, Borislav

Geological and mineralogical research on the hydroquartzites near Popina, Serbia. Stojan Pavlovič and Borislav Maksimovič. *Zbornik radova geol. inst. "Jovan Žujović"* 9, 1-10(1957)(French summary).—Chem. analyses of 28 samples are given; they contain SiO_2 87.7–98.5%. These are hydrothermal veins along faults. Michael Fleischer 3

58
11

MAKSIMOVIC, BORIVOJ

Doba velikih geografskih otkrica. Zagreb, Novinarsko izdavacko poduzece, 1955. 388, [8] p. [Period of great geographical discoveries. illus., maps, bibl.]
NN Not in DLC

SOURCE: East European Accessions List (EEAL), Library of Congress, Vol. 5, No. 12, December 1956.

MAKSIMOVIC, B. and MARKOVIC, B.

"Contribution to the Study of Albian and Cenomanian in Serbia; Albian and Cenomanian Fauna of the Terrain Between Kadina Luka and Lajac, Western Serbia" p. 183
(ZBORNIK RADOVA, Vol. 33, 1953, Beograd, Yugoslavia)

SO: Monthly List of East European Accessions, LC, Vol. 3, No. 5, May 1954/Uncl.

MAKSIMOVIC, B.

"Geology and Tectonics of the Terrain between [illegible] and [illegible], [illegible] Serbia" p. 151
(ZBORNIK RADOVA, Vol. 33, 1953, Beograd, Yugoslavia)

SO: Monthly List of East European Accession, LC, Vol. 3, no. 5, May 1954/ Uncl.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700047-6

MAKSIMOVIC, B., KOSTIC, V., and [illegible], K.

"Geologic and Tectonic Relations of the Senonian Layers of the Podvis-Tresibaba Coal Mine, Eastern Serbia" p. 1
(ZBORNIK RADOVA, Vol. 33, 1953, Beograd, Yugoslavia)

SO: Monthly List of East European Accessions, LC, Vol. 3, no. 5, May 1954/ Uncl.

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700047-6

SAVIC, Isidor, prof.dr. (Beograd, Risanska 10a); OSTRIC-MATIJASEVIC, Biserka, dr inz., strucni saradnik; MAKSIMOVIC, Bogdan, dr. naucni saradnik

Lyophilization of meat. Tehnika Jug 18 no.7:Supplement: Prehran ind 17 no.7:1340-1344 Jl'63

1. Rukovodilac naucne i strucne problematike Instituta za tehnologiju mesa SFRJ, Beograd (for Savic). 2. Institut za tehnologiju mesa SFRJ, Beograd (for Ostric-Matijasevic, Maksimovic.

STOJANOVIC, Svetislav, prof., dr.; MILOSEVIC, Dorde, dr.; LAZAREVIC, Milan, dr.; IVANOVIC, Milenko, dr.; MAKSIMOVIC, Bozidar, dr.

Open leg fractures. Voj.san.pregl. 18 no.4:339-344 Ap '61.

1. Medicinski fakultet u Beogradu, Klinika za ortopedsku hirurgiju i traumatologiju.

(LEG fract & disloc)

MAKSIMOVIC, B., BILEK, F.

Porcelain gallbladder. Rozhl. chir. 35 no.4:221-229
Apr 56.

1. Z chirurgicke kliniky hygienicke fakulty Karlovy university
v Praze XII, prednosta prof. Dr. E. Polak, z obvodniho rtg
strediska OUNZ v Praze XIII, vedouci lekar Dr. F. Bilek.
(GALLBLADDER, dis.
calcification, x-ray diag. & surg. (Cz))

LABAN, M.; BUDIMIR, M.; MIJUSKOVIC, B.; SPASIC, P.; MAKSIMOVIC, B.;
MIKOVANOVIC, M.

Spirometric apneic coefficients. Acta med. iugoslavl. 15 no.1:
20-42 '61.

1. Institut za tuberkulozu Narodne Republike Srbije u Beogradu.
(SPIROMETRY)

MAKSIMOVIC, A., inz. [translator]

Production of malleable in the United States of America. Livarstvo 9 no.48:136-145 Jl '62.

MIDDLETON, J.M.; MCILROY, P.G.; MAKSIMOVIC, A., inz. [translator]

Mold coatings for steel castings. Livarstvo 9 no.47:93-107 My '62.

ACC NR: AR6013664

stage is free growth in which the process goes autocatalytically. The fourth stage is a break in the coherence of the crystal with the matrix and growth stoppage. Also considered is the effect of structural defects in the initial solid mixture on martensite transformation during plastic deformation. 90 references. Ye. Vlasova.

SUB CODE: 11

Card 2/2

ACC NR: AR6013664 SOURCE CODE: UR/0058/65/000/010/E028/E028

AUTHOR: Maksimova, O. P.

TITLE: The transformation of austenite into martensite

SOURCE: Ref. zh. Fizika, Abs. 10E218

REF SOURCE: Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, vyp. 36, 1964, 169-186

TOPIC TAGS: martensitic transformation, austenite transformation, crystal growth

TRANSLATION: The martensite transformation is characterized by a high sensitivity to external and internal actions on austenite. Both external actions (deformation, nuclear irradiation, etc.) and internal (phase hardening) result in the formation of structural defects. The character, distribution and concentration of these defects have an effect on the kinetics of the process. The defect concentration is the most important factor. The introduction of defects initially produces activation of the process. Greater concentrations, however, slow down the martensite transformation. The growth of martensite crystals proceeds in four stages. The first stage is the formation of seeds--distortions at this point play an important role. The second stage is the growth of the seeds up to a certain critical size. An increase in the concentration of distortions in the solid mixture impedes this process. The third

Card 1/2

MAKSIMOVA, O.P.

Transformation of austenite into martensite. Probl. metalloved. i fiz. met. no.8:169-186 '64.
(MIRA 18:7)

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700047-6

S/020/62/142/002/016/029
B104/B138

Variation in the kinetics ...

ASSOCIATION: Institut metallovedeniya i fiziki metallov Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii im. I. P. Bardina (Institute of Metallography and Physics of Metals of the Central Scientific Research Institute of Ferrous Metallurgy imeni I. P. Bardin)

PRESENTED: August 4, 1961, by G. V. Kurdyumov, Academician

SUBMITTED: August 4, 1961

Table 1. Composition of alloys.

Fig. 1. Initial rate of martensitic transformation, and isothermal martensitic transformation with 4.3% previous partial transformation as functions of temperature.
Legend: (a) rate of transformation in 10/min (b) quantity of isothermal martensitic (1) after annealing (2) after partial transformation at -196°C (3) maximum rate of transformation after annealing.

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Variation in the kinetics ...   S/020/62/142/002/016/029
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only 1% martensite formed at -196°C is present. Further increase of up to 10% in pre-formed martensite causes only slight further increases in T_M. It is known that martensitic transformations can be produced above T_M by plastic deformations. A point M_d exists above which deformation ceases to cause this transformation. M_d is a little below T'_M. Comparison of M_d and T'_M leads to the conclusion that distortions of the austenite lattice caused by the martensite transformation (i.e. due to internal effects) reduce the amount of energy of elastic distortions dissipated in the nucleation of the new phase to a greater extent than do the defects due to plastic deformations (i.e. external effects). G. A. Levin participated in the experimental work. There are 1 figure, 5 tables, and 8 references: 5 Soviet and 3 non-Soviet. The three references to English-language publications read as follows: L. Kaufman, M. Cohen, J. Metals, 8, no. 10 (II), 1393 (1956); A. W. McReynolds, J. Appl. Phys., 20, no. 10, 896 (1949); J. B. Hess, C. S. Barrett, Trans. AIMME, 194, 645 (1952).

Card 2/4 3

S/020/62/142/002/016/029
B104/B138

AUTHORS: Maksimova, O. P., and Estrin, E. I.

TITLE: Variation in the kinetics of martensite transformation under the influence of previously formed martensite

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 2, 1962, 330-333

TEXT: The influence of an existing partial martensitic structure on the rate of martensite transformation was studied on four different Н23Г4 (N23G4) alloys (Table 1). In specimens cooled down to -196°C a specified amount of martensite was produced by isothermal transformation at this temperature. The specimens were then quickly transfered to a tank, and a special device was used to record the martensite development at the tank temperature. The martensite point T_M of the four alloys after annealing is between -70 and -90°C, and after partial martensitic transformation at -196°C, it (T_M') lies between +15 and +55°C. The initial rate of isothermal transformation grows with transformation temperature (Fig. 1), and the range increases (more than 100°). A very sharp increase in T_M occurs if

Card 1/4 3

KASHUBA, Zh.B.; MAKSIMOVA, O.P., kand.tekhn.nauk; ESTRIN, E.I.

Experimental study of the autocatalytic effect in martensite transformation. Probl.metalloved.i fiz.met. no.7:315-341 '62. (MIRA 15:5)

(Steel—Metallography) (Phase rule and equilibrium)

General relationships and specific ... S/717/62/000/007/006/010
D207/D302

mation. There are 19 figures and 54 references: 43 Soviet-bloc and 11 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: H.C. Fiedler, B.L. Averbach, and M. Cohen, Trans. ASM, 47, 291, 1955; C.H. Shin, B.L. Averbach and M. Cohen, J. Metals, 7, no. 2, 183, 1955; J. Philibert and C. Crussard, J. Iron and Steel Inst., 180, no. 5, 39, 1955; R.E. Cech, and D. Turnbull, J. Metals, 8, no. 2, 124, 1956.

Card 2/2

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700047-6

S/717/62/000/007/006/010
D207/D302

AUTHOR: Maksimova, O.P., Candidate of Technical Sciences

TITLE: General relationships and specific features of the effect of various agencies on transformation of austenite into martensite

SOURCE: Dnepropetrovsk. Institut metallovedeniya i fiziki metallov. Problemy metallovedeniya i fiziki metallov, no. 7, Moscow, 1962, 246 - 280

TEXT: The author reviews the published work on the transformation of austenite into martensite in various iron alloys, including steels. The effects of various preliminary treatments (plastic deformation, cold working and irradiation with neutrons, deuterons, etc.) on the subsequent transformation are considered in detail. Such treatments produce defects and stresses which can accelerate or retard the transformation. Nevertheless all these external agencies do not alter the intrinsic nature of the martensitic transformation which is thermal and self-accelerated by elastic stresses set up during the transfor-

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20213

On the Problem of Internal ...

S/126/61/011/002/012/025
E193/E483

lattice distortions. Regarding the peak (C), the fact that it was observed only in specimens containing martensite and that it occurred in the temperature range of the reverse martensitic transformation indicated that this peak is due to the increase in the internal friction, caused by the $\alpha \rightarrow \gamma$ transformation. K.M.Rozin, B.N.Finkel'shteyn, T.Ke and Ch.Tszen are mentioned for their contributions in this field. There are 4 figures, 1 table and 20 references: 13 Soviet and 7 non-Soviet.

ASSOCIATION: Institut metallovedeniya i fiziki metallov TsNIIChM (Institute of Science of Metals and Physics of Metals, TsNIIChM)

SUBMITTED: March 12, 1960

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results of the study of the temperature dependence of internal friction can be summarized as follows: (i) no anomalies were observed on the internal friction curves for the fully annealed specimens; (ii) curves for specimens that had undergone partial $\gamma \rightarrow \alpha$ transformation had the following specific features: a peak (A) at 170°C, the magnitude of which increased with increasing proportion of martensite in the specimens, a peak (B) at 290°C, a ledge (C) at 580°C, a ledge (D) at 730°C, a sharp peak (E) at 810°C; (iii) after the $\gamma \rightarrow \alpha \rightarrow \gamma$ transformation, the specific features (A) and (C) disappeared completely and the ledge (D) almost completely, peak (B) becoming more pronounced and shifted to a lower temperature (approx 250°C); (iv) after a supplementary annealing, the height of peak (B) decreased. Since the specific features (A), (D) and (E) have no direct bearing on the problem under investigation, peaks (B) and (C) are discussed in detail. It is shown that the internal friction peak at 250°C is associated with the re-orientation of pairs of carbon atoms which takes place as a result of stresses, set up in the alloy, it being postulated that the relaxation processes leading to the appearance of peak (B) cannot take place in the absence of

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On the Problem of Internal ... S/126/61/011/002/012/025
E193/E483

ensuring the maximum supplementary stabilization of the γ-phase (1 h at 525°C). The kinetics of the martensitic transformation were studied by the magnetostriction measurements, the torsional vibration method having been used to determine the temperature dependence of internal friction. In both cases, wire specimens (0.7 mm in diameter) preliminarily vacuum-annealed at 1100°C were used, extra precautions having been taken to avoid any plastic deformation of the specimens during handling. Specimens, containing various proportions (11, 24, 28 and 48%) of martensite, were prepared by rapid quenching in liquid nitrogen, followed by heating to room temperature at various heating rates. The $\alpha \to \gamma$ transformation was carried out by immersing the specimens for 10 sec in a salt bath at 540°C and water quenching. The results of the study of the kinetics of the $\gamma \to \alpha$ transformation in wire specimens confirmed the results obtained earlier on standard specimens (Ref.2 and 4): with increasing degree of "phase work-hardening" the stability of austenite increased after both $\gamma \to \alpha$ and $\gamma \to \alpha \to \gamma$ transformation. The stability of martensite was further increased by annealing at 525°C. The

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S/126/61/011/002/012/025
E193/E483

AUTHORS: Estrin, E.I., Zuyeva, O.M., Maksimova, O.P. and Piguzov, Yu.V.

TITLE: On the Problem of Internal Friction Effects Associated With the Direct and Reverse Martensitic Transformation

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.2, pp.252-260

TEXT: The object of the present investigation was to study the phenomena of "phase work-hardening", i.e. the structural changes brought about in the γ-phase of the 73.5 Fe-23.7 Ni-2.8 Mn alloy during the martensitic transformation. To this end, the variation of the kinetics of the martensitic transformation during cooling was studied as well as the character of the temperature dependence of internal friction of specimens, subjected to one of the following heat treatments: (1) $\gamma \rightarrow \alpha$ transformation, carried out to various degrees of completion; (2) $\gamma \rightarrow \alpha \rightarrow \gamma$ transformation carried out to attain various degrees of stability of austenite; (3) $\gamma \rightarrow \alpha \rightarrow \gamma$ transformation, followed by annealing under conditions

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84692

The Autocatalytic Character of the Martensite Transformation

S/020/60/134/004/019/023
B004/B064

PRESENTED: May 13, 1960, by G. V. Kurdyumov, Academician

SUBMITTED: April 20, 1960

X

Card 3/3

The Autocatalytic Character of the Martensite Transformation

S/020/60/134/004/019/023
B004/B064

at low temperature exerted a strong stimulating effect on the subsequent transformation. With a given M_{cool}, M_{heat} is a constant for each alloy that does not depend on the preliminary treatment. Experimentally, the course of isothermal transformation was investigated in an Fe-Ni-Mn alloy at -90°C as a function of the martensite (M_{-196^o}) formed at -196°C (Figs. 2,3). Also in this case the autocatalytic character of transformation was confirmed. The rate of transformation increases rapidly up to M_{-196^o} = 5%; a lesser increase was observed at M_{-196^o} = 10%. Furthermore, isothermal transformation was investigated under conditions under which the transformation rate is low. As may be seen from Fig. 4, the transformation rate undergoes an acceleration that even after three hours has not yet reached its maximum. There are 4 figures and 24 references: 14 Soviet, 5 US, 1 British, 1 Chinese, 1 French, and 1 Japanese.

ASSOCIATION: Institut metallovedeniya i fiziki metallov Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii im. I. P. Bardina (Institute of Metal Studies and Physics of Metals of the Central Scientific Research Institute of Ferrous Metallurgy imeni I. P. Bardin)

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18.7500 2308 only 1

S/020/60/134/004/019/023
B004/B064

AUTHORS: Maksimova, O. P., Soboleva, N. P., Estrin, E. I.

TITLE: The Autocatalytic Character of the Martensite Transformation 18

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 4, pp. 871-874

TEXT: In the introduction, the authors give a survey of publications on martensite transformation (Refs. 1-24). They investigated the autocatalytic effect of this process by analyzing the experimental material so far available and by new experiments. On the basis of data found in the course of the last ten years for martensite transformation in strong cooling and subsequent heating, the ratio between the heating effect M_{heat} and the effect M_{cool} of the previous cooling was determined for Fe-Ni-Mn and Fe-Cr-Ni alloys (Fig. 1). The alloys H24Г3 (N24G3) with 0.065% C, 23.7% Ni, 2.82% Mn and H23Г4 (N23G4) with 0.05% C, 23.0% Ni, 4.00% Mn are mentioned. The curves obtained show a distinct maximum near the ordinate (M_{heat}/M_{cool}). Therefore, the martensite crystals formed already

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81400

The Effect of the Phase Hardening of Austenite

S/020/60/132/06/21/068
B014/B007

are 3 figures and 10 Soviet references.

ASSOCIATION: Institut metallovedeniya i fiziki metallov Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii (Institute of Metallography and Metal Physics of the Central Scientific Research Institute of Ferrous Metallurgy)

PRESENTED: March 7, 1960, by G. V. Kurdyumov, Academician

SUBMITTED: March 2, 1960

Card 3/3

The Effect of the Phase Hardening of Austenite

81400

S/020/60/132/06/21/068
B014/B007

the formation of a structural disturbance. Moreover, it was found that phase hardening changes the stability of various austenite zones, and that the martensite crystals formed in the cooling of austenite are considerably smaller than those formed in the cooling of annealed austenite. The diagrams of Fig. 2 graphically show the structural changes, and details of such changes are discussed. Diagram B in Fig. 2 shows the broadening of the line (311) of austenite, and diagram V shows the microhardness. The complex interrelations show that the annealing process takes place not only within a range of temperature in which quick recrystallization occurs, but also at considerably lower temperatures. Finally, the results obtained by investigations of the annealing process of strain-hardened austenite are given. It was found that during annealing in the temperature range of from 450 to 550°C the stabilization process is increased. A broadening of the X-ray interference lines is observed already at 350°C. Thus, it may be said that the change in the crystal structure of austenite in direct and inverse martensite transformation leads not only to a stabilization of austenite, but is also the cause of the changes occurring as a result of subsequent annealing, as is shown by the increasing stability of austenite against martensite transformation. There

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S/020/60/132/06/21/068
B014/B007

18.7500

AUTHORS: Maksimova, O. P., Estrin, E. I.

TITLE: The Effect of the Phase Hardening of Austenite 18

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 6, pp. 1303 - 1306

TEXT: The authors describe investigations they carried out of the influence exerted by phase hardening on the kinetics of martensite transformation. The results were obtained by means of thermomagnetic, X-ray, and metallographic studies. Phase hardening was carried out by sharp quenching to various temperatures followed by heating, so that the transformation $\alpha \longrightarrow \gamma$ was secured. It turned out that direct and inverse martensite transformation cause stabilization of austenite. The influence exerted by phase hardening upon the transformation in the case of continuous cooling manifested itself in temperature rise at the beginning of transformation. The influence exerted by the transformations $\gamma \longrightarrow \alpha \longrightarrow \gamma$ on isothermal martensite transformation manifested itself in an increase of the martensite point. The metallographic studies disclosed

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69695
S/126/60/009/03/018/033
E111/E452

The Autocatalytic Effect in the Martensite Transformation

are 6 figures and 18 references, 15 of which are Soviet and 3 English.

ASSOCIATION: Institut metallovedeniya i fiziki metallov TsNIIChM (Institute of Metallurgy and Physics of Metals TsNIIChM)

SUBMITTED: November 9, 1959

Card 4/4

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S/126/60/009/03/018/033
E111/E452

The Autocatalytic Effect in the Martensite Transformation

This phenomenon, so far incompletely explained, is a relaxation effect (Ref 7,8) involving both elimination of activating faults and formation of inhibiting faults. The authors attribute the autocatalytic effect to the special features of the process giving rise to elastic deformation of the austenite crystal lattice near the martensite crystals formed. These elastic distortions are due to the cooperative mechanism of the transformation and the close association of atomic movements; the relatively high yield-point strength of austenite at low temperatures corresponding to martensite transformation; the small extent of relaxation processes at relatively low temperatures. A contributing factor can be the volume change in phase transition due to different directional growth rates of the martensite crystal. In conclusion, the authors maintain that the cooling effect is a more direct characteristic of austenite stability than is the overall cooling + heating; the strictest characteristics are the temperature of the start of isothermal transformation and its initial speed. There

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69695

S/126/60/009/03/018/033
E111/E452

The Autocatalytic Effect in the Martensite Transformation

the ratio of the effects of the transformation on heating to that on cooling as a function of the effect on cooling for various states of the austenite: the curves shown relate to alloys Fe-Ni (23.7%)-Mn(2.8%) and Fe-Ni(22.9%)-Mn(3.1%). Fig 6 gives a schematic representation of the relation to temperature of these two effects. The authors conclude that previously formed martensite crystals have an autocatalytic effect on the process: until shortage of places capable of transformation becomes the limiting factor the relative intensity of the transformation on heating to room temperature rises greatly as the effect of preliminary intensive cooling rises; for a given cooling effect that of subsequent heating is constant for a given alloy; exhaustion of all austenite capable of undergoing transformation on heating occurs when as little as 0.8 to 1.0% martensite is formed in the cooling process. The authors maintain that further studies of the autocatalytic effect should be made in close association with the related phenomenon of thermal stabilization of austenite.

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69695

S/126/60/009/03/018/033
E111/E452

18.7500

AUTHORS: Maksimova, O.P. and Estrin, E.I.

TITLE: The Autocatalytic Effect in the Martensite Transformation 18

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol 9, Nr 3, pp 426-436 (USSR)

ABSTRACT: The authors survey some literature on effects involved in the martensite transformation (Ref 1 to 11), excluding distortions taking place in the lattice of newly formed martensite alpha phase. The object of the present investigation was the examination of the role of elastic deformations arising in the austenite crystal lattice during the martensitic transformation; these could have a definite autocatalytic influence on the further development of the process from its earliest stages. They supplement the considerable experimental evidence on type N23GZ alloys supporting this possibility (Ref 12,13, 14,17; Fig 1,2,3,4 respectively), with their own previously obtained results for several iron-nickel-manganese alloys obtained when investigating the influence of preliminary plastic deformation and other factors on the kinetics of the martensite transformation. Fig 5 shows

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80979
S/180/60/000/03/010/030
E111/E352

The Additional Stabilization Effect in Annealing Internally Work-hardened Austenite

γ-phase stability change during annealing of previously phase work-hardened austenite in type N23GZ alloys: two at temperatures below the recrystallisation temperature, the third near this temperature and the fourth extending from it to 1 150 - 1 200 °C. The authors recommend research to find whether the relations apply to other types of alloy as well as their more detailed study. There are 7 figures, 2 tables and 10 Soviet references.

SUBMITTED: July 30, 1959

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80979

S/180/60/000/03/010/030
E111/E352

The Additional Stabilization Effect in Annealing Internally Work-hardened Austenite

shortly. The hardness remains constant while the temperature rises to 500 - 550 °C and beyond that begins to fall, reaching the value for austenite which has not been work-hardened (Figure 7). The results of X-ray interference study of alloy C are given in Table 2. The results of the present work confirm the complexity of stability changes of internally work-hardened austenite during gradually increasing annealing. The state produced immediately after the completion of reverse martensite transition does not, contrary to previous ideas, correspond to the highest austenite stability; annealing under definite conditions can increase it further. At least two elementary processes with opposite effect on stability occur during the annealing; they give the observed de-stabilisation and stabilisation. The additional stabilisation at 400 - 550 °C is attributed to polygonisation processes occurring in austenite disturbed by phase work-hardening. From the present and previous (Ref 8) work it appears that four pronounced stages exist in the

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E111/E352

The Additional Stabilization Effect in Annealing Internally Work-hardened Austenite

function of annealing temperature for 0, 30 and 65% degrees of phase work-hardening. Martensite transformation curves are given for alloy B for various annealing temperatures in Figure 3, while Figures 4 and 5 show the change in work-hardened austenite stability in relation to annealing temperature respectively for alloy B at 400 - 575 °C and alloy C at room temperature - 800 °C. Curves illustrating the change in stability with respect to duration (hours) of annealing at various temperatures are given in Figure 6 for alloys B and C (left- and righthand graphs, respectively). To elucidate the nature of changes in the crystal structure of internally work-hardened austenite during annealing, the authors studied alloy C in detail. Its hardness, electrical resistance, temperature-dependence of internal friction and fine structure of the internally work-hardened austenite annealed under various conditions were investigated. The resistance and internal-friction results are to be reported

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80979

S/180/60/000/03/010/030
E111/E352

18.2500

AUTHORS: Maksimova, O.P., Seredenko, S.Ya. and Estrin, E.I. (Moscow)

TITLE: The Additional Stabilization Effect in Annealing Internally Work-hardened Austenite

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, Nr 3, pp 57 - 65 (USSR)

ABSTRACT: Indications have been obtained by O.P. Maksimova et al (Ref 7) that annealing at temperatures near and somewhat below the reverse α and γ transformation should produce substantial changes in the state and stability of internally work-hardened austenite. The present work is devoted to this problem. Three type N23GZ alloys of the Fe-Ni-Mn system, A, B and C, were used containing respectively 0.06, 0.03, 0.06% C, 23.4, 22.9 and 23.7% Ni, 3.30, 3.06 and 2.82% Mn. Phase work-hardening was produced by forward and reverse transformation of a definite percentage ("degree of phase work-hardening") of the austenite, effected by controlled cooling and warming. The overall martensite transformation effect is plotted against this degree in Figure 1 for alloys B (Curve 1) and C. Figure 2 shows for alloy A the overall effect as a

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69658

S/180/60/000/02/014/028
E111/E152

Study of the Austenite Stabilization Effect in Phase Work Hardening

work hardening has different effects on the two alloys (Ref 7). The observed changes in kinetics (similar to those produced by stabilizing plastic deformation) can be explained by the relatively high temperature required for the reverse martensite transformation, which makes it impossible to retain those changes in austenite fine structure which favour formation of martensite nuclei. Phase work hardening was found to produce extension of structural faults in adjacent austenite zone, decrease in martensite grain size and, to some extent, relative stability of some austenite zones. In general, the changes produced are very stable (disappearing at 1100-1150 °C); their removal on raising the temperature takes place in a stepwise manner.
There are 11 figures, 1 table and 15 references, of which 14 are Soviet and 1 is English.

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SUBMITTED: July 30, 1959

69658

S/180/60/000/02/014/028
E111/E152

Study of the Austenite Stabilization Effect in Phase Work Hardening

transformation. Fig 3 gives the influence of degree of phase work hardening on the martensite transformation on subsequent cooling, while Figs 4 and 5 give for the nickel and the chromium alloys, respectively, isothermal martensite transformation curves for the initial and phase work-hardened states. Figs 6 and 7 give, for the same alloys respectively, the influence of phase work hardening on the starting rate of the isothermal martensite transformation (curves a) and on the overall effect of the transformation. In Fig 8 the influence of annealing temperature on the state of N23G3 subjected to different degrees of phase work hardening is shown, while Fig 9 shows effects for Kh17N8 alloy subjected to a 40% phase work hardening. Figs 10 and 11 show for the two alloys, respectively, microstructures at different stages of stabilization treatment and the nature of the martensite formed in subsequent cooling. The work showed that for both alloys phase work hardening depresses the "true" martensite point and the temperature range of the transformation, reducing its initial rate; external

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E111/E152

Study of the Austenite Stabilization Effect in Phase Work Hardening

structure of austenite; the rules governing the removal of the effects of this phenomenon during subsequent annealing at gradually increasing temperatures; the changes in martensite transformation kinetics produced by phase work hardening in contrast to those produced by a different sort of effect, e.g. plastic deformation or high-energy particle irradiation. Two types of alloy were used; Fe-Ni-Mn (N23G3) and Fe-Cr-Ni (Kh17N8); their respective compositions being 0.06, 0.05% C; 23.45, 8.40% Ni; 3.30, -% Mn; -, 17.34% Cr. These had been studied widely in connection with austenite stability and fine crystal structure (Refs 5-7, 12). The investigation involved thermomagnetic, X-ray, microstructure and microhardness methods. The experimental conditions chosen in the present work are represented in Fig 1. Phase work hardening was produced by cooling to a low temperature followed by heating in a tin bath to the lowest temperature at which the reverse martensite transition is completed; the heating conditions ensured that a martensite mechanism governed the alpha to gamma

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69658

S/180/60/000/02/014/028
E111/E152

18.7500

AUTHORS: Zakher, I.M., Maksimova, O.P., Nikonorova, A.I., Plemyannikova, I.M., and Yampol'skiy, A.M. (Moscow)

TITLE: Study of the Austenite Stabilization Effect in Phase Work Hardening

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, Nr 2, pp 93-103 (+ 2 plates) (USSR)

ABSTRACT: The authors suggest that the important problem of gamma-phase stabilization should be considered to include the action of any factor which raises stability without changing the chemical composition of the austenite (Refs 1-8). One of these is internal work hardening due to the martensite transformation itself (Ref 9), which has been described by Golovchiner and Yu.D. Tyapkin, and by Golovchiner and Landa (Ref 10). In superinvar alloy Maksimova and Golovchiner found a "super-stabilization" effect for austenite with respect to the martensite transformation in subsequent cooling. In the present work the aim was to find: the influence of various degrees of phase work hardening on austenite stability, kinetics of isothermal transformation and the micro- and submicro-

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SOV/24-58-7-1/36

On the Changes in the Kinetics of Martensitic Transformation as a Result of Irradiation

There are 7 figures and 8 references, 6 of which are Soviet and 2 English.

SUBMITTED: April 19, 1958

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SOV/24-58-7-1/36

On the Changes in the Kinetics of Martensitic Transformation as a Result of Irradiation

temperature range of removal of the effect of hardening brough about by irradiation (Ref 7). In the given case, the main part of the hardness increase of the irradiated austenite can also be eliminated by annealing in the temperature range 200-500 °C. Consequently, the process of re-establishment of the mechanical properties and of the stabilisation effect of the radiation of the austenite proceeds during heating in the same temperature range. In view of this, the assumption can be made that changes in the fine crystalline structure of the austenite, which bring about the radiation hardening of the γ-phase, are to a large extent responsible for the observed stabilisation of the irradiated austenite. Accordingly, the stabilisation effect of the radiation can be explained by the limitation of the growth of the martensite crystals in the distorted and hardened matrix.

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On the Changes in the Kinetics of Martensitic Transformation as a Result of Irradiation

annealing. The increase of the electric resistance during irradiation is due mainly to the occurrence of elementary defects of low stability of the penetration-atom type, which can be easily eliminated by recombination during storage and during low-temperature annealing. Thus, as a result of annealing, a decrease should take place in the concentration of the pair defects in the volumes affected by "thermal peaks". On the basis of the assumption that elastic distortions, brought about by "thermal peaks" and possessing a sufficiently high concentration of pair defects can lead to the germination of martensite crystals, the phenomenon of reduced activation and intensified stabilisation of the austenite during low-temperature annealing is understandable. It was found that elimination of the increased stability of the austenite in the irradiated alloy N22G3 will begin during annealing in the temperature range above 200 °C and this process is terminated on heating to 600-700 °C. It is known that the annealing temperature range between 200 and 500 °C is the

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On the Changes in the Kinetics of Martensitic Transformation as a Result of Irradiation

which the changes in the kinetics of martensitic transformation are attributed. The authors conclude that as a result of irradiation, defects of two distinct types are generated in the γ-phase which influence differently the stability of the austenite relative to that of the martensite. Low-stability defects bring about activation of the austenite. On the other hand, stabilisation of the γ-phase is due to the occurrence of radiation disturbances which possess a high stability. Elimination of the radiation effects of activation during storage and during annealing at relatively low temperatures (20-200 °C) in steels and further intensification of the stabilisation observed under the same conditions in alloys are phenomena which can be attributed to the removal of radiational disturbances of the same type. Obviously, these disturbances are "defects" which bring about an increase in the electric resistance of the irradiated metals. Such a conclusion can be derived from the results described in this paper and from analysis of literary data which indicate a coincidence of the temperature ranges of radiation effects during

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In Figure 3, the curves of isothermal martensitic transformation for irradiated and non-irradiated austenite are graphed for the temperatures of -25 and -50 °C. In Figure 4, the initial speed of isothermal martensitic transformation, as a function of the temperature, is graphed for irradiated and non-irradiated austenite. The graph, Figure 6, shows the influence of annealing on the stability of preliminarily irradiated austenite. In Figure 7, the changes are graphed of the martensitic point and of the microhardness during annealing of irradiated austenite. In Figure 5, microstructure photographs are reproduced of the martensite which formed in irradiated and non-irradiated specimens after isothermal holding for 7 hours at -50 °C. The results are in agreement with those obtained during earlier investigations relating to the influence of irradiation on the kinetics of martensitic transformation (Ref 1). The relations determined earlier (Ref 2) were confirmed and new relations were established which give a better understanding of the disturbances to

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On the Changes in the Kinetics of Martensitic Transformation as a Result of Irradiation

temperature. For solving the problem the authors used thermomagnetic, microstructural, X-ray and microhardness investigations. The experiments were carried out on 2.5 x 3.5 x 24.5 mm specimens of the alloy N22GZ (0.02% C, 22.4% Ni, 3.48% Mn, T_m = -15 °C) after homogenisation annealing at 1 150 °C in vacuum for 10 hours, followed by removal of the surface layer to a depth of 0.25 mm. The irradiation was effected in the active zone of a reactor in the neighbourhood of the uranium rods. During irradiation the temperature of the specimens increased by no more than 40 °C; the integral flux of the neutrons equalled $6.5 \cdot 10^{17}$ n/cm^2. As can be seen from Figure 1, the stabilisation effect of this dosage of irradiation was about twice as intensive as in earlier experiments in which a flux intensity of $4.2 \cdot 10^{17}$ n/cm^2 was used. In Figure 1 the martensitic transformation curves are graphed for a specimen which has been irradiated and also for one which has not been irradiated. In Figure 2 the curves of isothermal martensitic transformation at various temperatures are graphed for the irradiated and non-irradiated states.

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On the Changes in the Kinetics of Martensitic Transformation as a Result of Irradiation

earlier work (Refs 1,2), the authors applied neutron irradiation in investigating martensitic transformations. They established that preliminary neutron irradiation, with a dose of the order of 10^{17} n/cm^2, has a considerable influence on the stability of the austenite and on the martensite transformation. This change in the stability differed with the material. In steels, irradiation brought about an intensification of the martensitic transformation during subsequent deep cooling with a constant speed. In carbon-free iron, nickel, and in Mn-alloys, irradiation always had a stabilising effect on the γ-phase; it brought about a decrease of the martensitic point and of the transformation intensity. The aim of the work described in this paper was to investigate the influence of preliminary neutron irradiation on the kinetics of isothermal martensitic transformation at various temperatures. Furthermore, the authors aimed at elucidating the phenomena of eliminating the after effects of the radiation during annealing with a gradually increasing

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SOV/24-58-7-1/36

AUTHORS: Zakharov, A.I. and Maksimova, O.P. (Moscow)

TITLE: On the Changes in the Kinetics of Martensitic Transformation as a Result of Irradiation (Ob izmenenii kinetiki martensitnogo prevrashcheniya pod vliyaniyem oblucheniya)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 7, pp 3 - 9 (USSR)

ABSTRACT: So far, in the theory of martensitic transformation the problem of the nature of loci of germination of a new phase has not been clarified. Also, the process of formation of martensite germinations involves such phenomena as incomplete martensitic transformation and austenite stabilisation. Investigations aimed at elucidation of the nature of the process of formation of martensite germinations are of particular importance from the point of view of the development of the theory of martensitic transformations. The development of nuclear techniques has provided new possibilities for creating various defects in the crystal lattice. Irradiation by means of fast particles may produce more elementary disturbances in the structure than can be obtained otherwise. In

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SOV/126-6-1-12/33

Influence of Preliminary Plastic Deformation on the Martensitic Transformation in the Alloy Fe-Cr-Ni

was observed in various materials.
There are 6 figures and 11 references, 9 of which are Soviet, 1 German, 1 English.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (The Central Research Institute of Ferrous Metallurgy)

SUBMITTED: March 21, 1957

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1. Chromium-iron-nickel alloys--Transformations 2. Chromium-iron-nickel alloys--Deformation 3. Chromium-iron-nickel alloys--Heat treatment

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Influence of Preliminary Plastic Deformation on the Martensitic Transformation in the Alloy Fe-Cr-Ni

which favour the formation of martensite germinations and those which impede their formation. Comparison of the results relating to the influence of plastic deformation on the martensitic transformation in Fe-Ni-Mn and Fe-Cr-Ni systems leads to the conclusion that the intensity of the deformation caused changes of structural factors depends on the elastic-plastic properties of the austenite. The relation between the changes bringing about activation and braking of the martensitic transformations may differ depending not only on the degree of deformation but also on the elastic-plastic properties of the initial phase. As a result of this an unequal character of the effects of plastic deformation on the martensitic transformation

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Influence of Preliminary Plastic Deformation on the Martensitic Transformation in the Alloy Fe-Cr-Ni

of plastic deformation those structural changes will occur to an increasing extent which bring about the formation of germinations. However, even at such degrees of deformation changes occur in the austenite which impede transformation. With increasing degree of deformation and also with increasing deformation temperature, the changes in the structure which bring about braking of the transformations increase in importance. The changes in the fine crystalline structure, which activate the transformation are eliminated at relatively low annealing temperatures at which the width of interference lines does not yet change, i.e. whilst there are still no important changes in the magnitude of the Type II distortions or in the dimensions of the areas of coherent scattering. Changes in the structure braking the formation of germinations are maintained thereby; elimination of these takes place only at higher temperatures corresponding to the region of decrease in the degree of blurring of the lines. It is not possible as yet to establish those details of the fine structure

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Influence of Preliminary Plastic Deformation on the Martensitic Transformation in the Alloy Fe-Cr-Ni

austenite, of the total effect of martensitic transformation (during cooling and during heating) and the change of the martensitic point are graphed as functions of the annealing temperature for specimens of the Kh18N8 alloy deformed by 10% at 100°C. In Fig.6 the temperature dependence of the initial speed and the total effect of isothermal martensitic transformation are graphed for non-deformed and deformed (8 and 17%) states for a deformation temperature of 100°C (alloy Kh17N9). It was found that, depending on the conditions of deformation and annealing, plastic deformation can have an activating or a braking effect on the martensitic transformation. Small degrees of deformation activate the transformation, i.e. widen the temperature range of the transformation, bring about an increase of the initial speed of the isothermal transformation and of the total quantity of the martensitic phase. Various changes in the fine crystalline structure of the austenite may lead either to easier formation of martensite nuclei during subsequent cooling or may impede their formation. For small degrees

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Influence of Preliminary Plastic Deformation on the Martensitic Transformation in the Alloy Fe-Cr-Ni

by measuring the width of the line (311). As a characteristic of the state of the structure of the austenite (Type II stresses, dimensions of the blocks and coherent scattering), the magnitude of physical widening of the (311) austenite lines was chosen. In Fig.1 the transformation of the austenite into martensite during cooling to -196°C and subsequent heating to +20°C is graphed after various degrees of preliminary plastic deformation at room temperature for the alloy Kh18N8; in Fig.2 the same relation is graphed for the case of deformations taking place at 100°C and at 175°C. In Fig.3 the change of the total effect of martensitic transformation as a function of the degree of preliminary plastic deformation is graphed for various temperatures of preliminary deformation for the alloy Kh18N8. In Fig.4 the influence of the annealing temperature on the transformation of the deformed austenite during cooling to -196°C and heating to 20°C is graphed for various degrees of deformation at 100°C (alloy Kh18N8). In Fig.5 the change of the widening of the line (311) of the

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Influence of Preliminary Plastic Deformation on the Martensitic Transformation in the Alloy Fe-Cr-Ni

martensitic transformation was studied. Investigations were carried out on flat 3.5 x 5.5 x 25.5 mm specimens which after manufacture were subjected to diffusion annealing at 1150°C for ten hours. The plastic deformation was effected by compression by means of a press at room temperature, at 100 and at 175°C. Deformation at 100 and 175°C was effected inside a special sleeve fitted with a heater winding ; as a medium for ensuring the temperature of 100°C boiling water was used, whilst deformation at 175°C was effected in glycerine. Evaluation of the change of the ability of the austenite to become transformed into martensite was effected by means of the thermo-magnetic method by plotting the curves of cooling to -196°C and subsequent heating to 20°C with a speed of 10°C/min. As the basic criterion of the stability of the austenite, the total transformation effect was chosen which was obtained as a result of cooling and heating. The change in the fine structure of the austenite during the plastic deformation and during the subsequent heating was investigated by the X-ray method

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Influence of Preliminary Plastic Deformation on the Martensitic Transformation in the Alloy Fe-Cr-Ni

such investigations could not be effected on steel. If the assumption on the favourable influence of stresses on the martensitic transformation of deformed austenite would be correct, the effect of activation should be eliminated in the case of heating in the range of relatively low temperatures. Another aim of the described work was to study the influence of deformation on the isothermal martensitic transformation for the purpose of elucidating the characteristic features of the changes in the kinetics caused by the influence of the activating and/or the braking effects of deformation. Since the activating influence of deformation can only be detected in alloys with high elasticity values, it was decided to carry out the experiments on the alloy Kh18N8 (0.03% C, 18.10% Cr, 8.1% Ni) and the alloy Kh17N9 (0.05% C, 17.25% Cr, 9.16% Ni), both of which are similar in composition and as regards the martensitic point. On the alloy Kh18N8 the influence of deformation and subsequent heating for obtaining martensitic transformation during cooling was studied, whilst on the alloy Kh17N9 the influence of deformation on the isothermal

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SOV/126-6-1-12/33

AUTHORS: Kurdyumov, G. V., Maksimova, O. P., Nikonorova, A. I., Pavlenko, Z. D., and Yampol'skiy, A. M.

TITLE: Influence of Preliminary Plastic Deformation on the Martensitic Transformation in the Alloy Fe-Cr-Ni (Vliyaniye predvaritel'noy plasticheskoy deformatsii na martensitnoye prevrashcheniye v splave Fe-Cr-Ni)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 1, pp 95-105 (USSR)

ABSTRACT: The results are described of experiments carried out for elucidating the finer features of the influence of plastic deformation and subsequent annealing on the martensite transformation in Fe-Cr-Ni alloys of the type Kh18N8. The aim was to establish the activating effect of deformation in such an alloy and to verify the validity of the assumption of the activating influence of stresses on the martensitic transformation of deformed austenite. For this it was necessary to study the character of elimination of the after effects of deformation with gradually increasing annealing temperature; in view of the possible super-position of diffusion processes onto the processes of stress elimination during annealing,

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SOV/137-58-8-17644

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 207 (USSR)

AUTHORS: Maksimova, O.P., Zakharov, A.I.

TITLE: On the Laws Governing the Elimination of Radiation Damage Upon Annealing. (A Survey) [O zakonomernostyakh ustraneniya radiatsionnykh narusheniy pri otzhige. (Obzor)]

PERIODICAL: Sb. tr. in-t metalloved. i fiz. metallov. Tsentr. n.-i. in-ta chernoy metallurgii, 1958, Vol 5, pp 528-549

ABSTRACT: A review of the laws governing the elimination of radiation damage upon the annealing of metals. The character of and the laws governing the complex modifications of physical and mechanical properties and phase transformations in metals occurring upon irradiation, and the processes and the laws governing the restitution of the initial properties to metals upon annealing were examined together with an analysis of modifications occurring in five temperature ranges. Bibliography: 37 references.

V. A.

1. Metals--Effects of radiation
2. Metals--Heat treatment

Card 1/1

MAKSIMOVA, O.P., kand.tekhn.nauk; GOLOVCHINER, Ya.M.; LYUBOV, B.Ya., doktor fiz.-mat.nauk; NIKONOROVA, A.I., kand.tekhn.nauk

Basic trends in research on the martensite transformation theory. Probl. metalloved. i fiz. met. no.5:147-160 '58. (MIRA 11:4)
(Phase rule and equilibrium) (Martensite)

SOV/137-58-8-17677

Employment of Neutron Irradiation in Studying Martensite Transformations

were allowed to age at room temperature. The NI significantly influences the position of the martensite point and the over-all T effect; the latter also depends on the type of material in question. In the case of carbon steels, the NI elevates the martensite point and increases the T effect during deep cooling. In the case of carbon-free alloys, the NI affects austenite in an opposite fashion viz., the martensite point is lowered and the intensity of T during cooling is reduced. In carbon steels, a certain amount of martensite is formed already during the NI process. The manner in which irradiation affects martensite T has much in common with the effect of plastic deformation. The aging of specimens at room temperature results in improved stability of austenite. The poor temperature stability of the activating effect of NI indicates that it is governed by formation of defects of the vacancy interstitial-intrusion type which produce elastic deformations in the crystal lattice. The stabilizing effect of NI is brought about by the formation of defects that are caused by division and disorientation of crystals, as a result of which the chances for the appearance and growth of martensite crystals are diminished.

M. Sh.

1. Martensite--Transformations 2. Martensite--Effects of radiation 3. Neutrons--Metallurgical effects

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SOV/137-58-8-17677

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 211 (USSR)

AUTHORS: Zakharov, A. I., Maksimova, O. P.

TITLE: Employment of Neutron Irradiation in Studying Martensite Transformations (Primeneniye neytronnogo oblucheniya dlya issledovaniya martensitnogo prevrashcheniya)

PERIODICAL: Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, 1958, Vol 5, pp 124-135

ABSTRACT: The effect of neutron irradiation (NI) on martensite transformation (T) was investigated on five types of steel containing respectively: 0.48% C, 7.7% Mn, 2.2% Cu (steel 50G8); 1.4% C, 4.0% Mn (steel 140G4); 0.50% C, 21.0% Ni (steel 50N21); 0.025% C, 22.7% Ni, 2.88% Mn (steel N23G3); 0.020% C, 22.4% Ni, and 3.48% Mn (steel N22G3). The effect of NI was evaluated by the change of progress of the martensite curves during cooling of specimens to a temperature of -196°C and heating to a temperature of 20°. The specimens were subjected to NI in the active zone, near the U rods, of an experimental physical heavy water reactor for periods of 100 and 200 hours. Following the NI the specimens

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SOV/137-58-8-17676

On the Incubation Period in Martensite Transformation

austenite) results in a condition in which the incubation period is apparent throughout the entire interval of the MT. The duration of the incubation period is at a minimum when the degree of supercooling corresponds to the maximum rate of progress of the process. An incubation period during the MT became evident in the case of certain other alloys also. During investigations of the Kh17N8 alloy it was established that the time of approach to the isotherm located in the vicinity of the martensite point affects the rate of subsequent isothermal MT. It is assumed that no significant temperature lag exists between the surface and the center of a specimen during its cooling.

M. Sh.

1. Martensite—Transformations

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SOV/137-58-8-17676

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 211 (USSR)

AUTHORS: Maksimova, O. P., Nikonorova, A. I.

TITLE: On the Incubation Period in Martensite Transformation (Ob inkubatsionnom periode pri martensitnom prevrashchenii)

PERIODICAL: Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, 1958, Vol 5, pp 56-65

ABSTRACT: The authors describe the process of martensite transformation (MT) by considering it as a phase transition in a single-component system. Unlike the usual phase transformations which are characterized by a very slow initial progress during isothermal exposure followed by a gradual increase in rate, the transformation rate during isothermal MT is at a maximum initially and decreases subsequently as the time of exposure is increased. However, the process of isothermal MT proceeding at an increasing rate may be observed during phase hardening, as well as in the presence of very small degrees of supercooling. In the alloy N23G3, at a small degree of supercooling, isothermal MT is preceded by an incubation period. The phase hardening of this alloy (with concurrent transformation of 30% of

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The Effect of Preliminary Plastic Deformation (cont.)

action of PD on the MT is a function not only of the degree of the PD, but of the plastic-elastic properties of the initial phase as well.

M. Sh.

1. Chromium-iron-nickel alloys--Analysis
2. Martensite--Transformations
3. Martensite--Deformation
4. Martensite--Temperature factors

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The Effect of Preliminary Plastic Deformation (cont.)

cooling of the material to -196° followed by heating to a temperature of 20° at a rate of 10°/min. The summary transformation effect obtained as a result of the cooling and heating processes was taken as a criterion of stability of A. After deformation and annealing, the crystalline substructure of the A was characterized by the width of X-ray interference lines. It is established that, depending on the conditions of PD and annealing procedures the PD may have an activating or a retarding effect on the MT. A small degree of PD extends the temperature range of the MT, increases the initial rate of isothermal transformation, and increases the over-all quantity of martensite. As the degree of PD and the temperature at which it is accomplished are increased, the PD begins to exert a retarding influence on the ability of A to undergo MT. Annealing of metal in the temperature range between 100° and 400° eliminates the activating effect of a preceding PD without destroying its retarding effect. At PD of a high degree, annealing at temperatures of 100-400° results in an additional improvement of the stability of A. The activation of the MT is affected by stresses which arise during PD; these stresses are restricted to small volumes and are different from stresses of type II, which are determined by the blurring of the interference lines. The retarding action of PD is affected by the breaking up of the zones of coherent dispersion of X-rays, an effect which hampers the formation of martensite nuclei. The activating and retarding

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SOV/137-58-8-17675

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 210 (USSR)

AUTHORS: Kurdyumov, G. V., Maksimova, O. P., Nikonorova, A. I., Pavlenko, Z. D., ~~Yampol'skiy, A. M.~~

TITLE: The Effect of Preliminary Plastic Deformation on Martensite Transformation in Fe-Cr-Ni Alloys (Vliyaniye predvaritel'noy plasticheskoy deformatsii na martensitnoye prevrashcheniye v splavakh Fe-Cr-Ni)

PERIODICAL: Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, 1958, Vol 5, pp 41-55

ABSTRACT: Investigations were performed in order to evaluate the effect of plastic deformation (PD) and subsequent heating on processes of martensite transformation (MT) during cooling, and on isothermal MT in an alloy composed of Kh18N8 (0.03% C, 18.10% Cr, and 8.1% Ni) and Kh17N9 (0.05% C, 17.25% Cr, and 9.16% Ni). The PD was effected by compression of specimens in a press at room temperature, as well as at temperatures of 100 and 175°C. Changes in the ability of austenite (A) to undergo transformations were evaluated by means of a thermomagnetic method involving plotting of martensite cooling curves during

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SOV/137-58-9-19825

Changes in the Kinetics of Martensite Transformation (cont.)

throughout the entire temperature range; this is particularly apparent in the alloys of the Fe-Ni-Mn system in which the temperature curves of the transformation rate possess a maximum regardless of the position of the T_M and exhibit no tendencies toward limiting the temperature interval of the ascending branch. In the case of Mn steel the ascending branch of the rate curve is gradually lowered as the temperature interval is reduced; at temperatures of approximately -50° it disappears entirely. It is assumed that the difference in behavior of alloys and steels is attributable to the difference in elastic-plastic properties of austenite contained in these materials.

V.R.

1. Martensite--Transformations 2. Manganese steel--Phase studies
3. Martensite--Temperature factors 4. Austenite--Metallurgical effects

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SOV/137-58-9-17

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 245 (USSR)

AUTHORS: Maksimova, O.P., Ponyatovskiy, Ye.G., Rysina, N.S., Orlov, L.G.

TITLE: Changes in the Kinetics of Martensite Transformation as a Function of the Position of Martensite Point and the Composition of the Alloy (Izmeneniye kinetiki martensitnogo prevrashcheniya v zavisimosti ot polozheniya martensitnoy tochki i sostava splava)

PERIODICAL: Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, 1958, Vol 5, pp 25-40

ABSTRACT: The effect of the position of the martensite point, T_M, on the kinetics of martensite transformation was studied on a number of Mn-alloyed steels (85G2, T_M 155°C; 95G3, T_M 85°; 70G6, T_M -40°) as well as on a series of carbon-free alloys of the Fe-Ni-Mn system containing approximately 23% Ni and 3% Mn. A time-temperature transformation curve for the alloy N24G3 was plotted on the basis of experimental data. As the position of the T_M is lowered, the initial transformation rate is reduced

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SOV/137-58-9-19824

On Laws Governing the Kinetics of Martensite Transformation

the MT is a result of thermal nucleation which progresses rapidly when, at a high degree of supercooling, the quantity of work required for the formation of the nuclei is small, or when the energy of thermal oscillations of the atoms is large (insufficiently low temperatures).

V.R.

1. Martensite--Transformations 2. Martensite--Temperature factors

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SOV/137-58-9-19824

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 245 (USSR)

AUTHORS: Kurdyumov, G.V., Maksimova, O.P.

TITLE: On Laws Governing the Kinetics of Martensite Transformation (O zakonomernostyakh kinetiki martensitnogo prevrashcheniya)

PERIODICAL: Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii, 1958, Vol 5, pp 13-24

ABSTRACT: The rate of martensite transformation (MT) was investigated at various temperatures on alloys of the Fe-Ni-Mn system. Among the principal factors determining the kinetics of the MT are the oscillations of the lattice atoms and energy fluctuations which govern the formation of martensite nuclei of critical size. The rate of formation of martensite may be reduced either by sufficient lowering of the temperature or by means of alloying, which tends to increase the amount of work required for nucleation. As the martensite point is lowered, the initial rate of MT is sharply reduced throughout the entire temperature interval, and the maximum rate is displaced into the region of lower temperatures. The "athermal" nature of

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Problems of Physical Metallurgy 983

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MAKSIMOVA, O.P.

PHASE I BOOK EXPLOITATION 983

Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Institut metallovedeniya i fiziki metallov

Problemy metallovedeniya i fiziki metallov (Problems of Physical Metallurgy). Moscow, Metallurgizdat, 1958. 603 p. (Series: Its: Sbornik trudov, v. 5)

Eds.: Lyubov, B.Ya. and Maksimova, O.P.; Ed. of Publishing House: Berlin, Ye.N.; Tech. Ed.: Karasev, A.I.

PURPOSE: This book is intended for scientists and engineers working in the field of physical metallurgy.

COVERAGE: The articles in the book present the results of investigations conducted by the issuing body, the Institut metallovedeniya i fiziki metallov (Institute of Physical Metallurgy), a part of the Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute of Ferrous Metallurgy), located in Dnepropetrovsk. The investigations were concerned with phase transformations in alloys, strengthening and softening processes, diffusion processes (studied with the aid of radioactive isotopes), and certain other questions. The studies conducted at the institute by V.I. Danilov in the fields of atomic and molecular structure of liquids and of crystallization processes are stated to have received wide recognition.

20-114-6-16/54

Martensite Transformations as Influenced by Bombardment With Neutrons

SUBMITTED: November 21, 1956

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20-114-6-16/54

Martensite Transformations as Influenced by Bombardment With Neutrons

site transformation. The modification of resistance varies according to different materials. In steels the bombardment (independent of the carbon content and of the character of the alloys) increases the intensity of martensite transformation on subsequent deep cooling. In iron-nickel-manganese (N23G3 and N22G3) alloys with no content of carbon the bombardment always exerts a stabilizing influence on the γ-phase. The influence of bombardment and the influence of plastic deformation have much in common. If the bombarded samples are left lying for a long time at room temperature, the resistance of austenite is increased. On bombardment structural changes take place in the metals and alloys which influence the resistance of austenite in opposite directions. The total action (activating and retarding) depends on the total flux of neutrons and on the peculiarities of the material. There are 3 figures and 16 references, 9 of which are Slavic.

ASSOCIATION: Central Scientific Research Institute for Ferrous Metallurgy (Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii)

PRESENTED: February 11, 1957, by G. V. Kurdyumov, Member of the Academy

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20-114-6-16/54

AUTHORS: Zakharov, A. I., Maksimova, O. P.

TITLE: Martensite Transformations as Influenced by Bombardment With Neutrons (Vliyaniye neytronnogo oblucheniya na martensitnoye prevrashcheniye)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 6, pp. 1195-1198 (USSR)

ABSTRACT: The present paper represents the first attempt to use the bombardment with neutrons in the study of martensite transformations. Steels and alloys were investigated in which the influence of the previous plastic deformation upon the martensite transformation was first thoroughly studied. The samples (2 x 3 x 24 mm) were bombarded in the active zone of a physical testing reactor with heavy water close to the uranium rods after previous (here described) heat treatment. One part of the samples was bombarded for 100 hours, the other part 200 hours with 10^{17} neutrons per cm^2. The modification of the strength of the austenite was estimated from the form of magnetometric curves on deep cooling and on heating.
Test results: Previous bombardment with neutrons exerts considerable influence upon the resistance of austenite to marten-

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The Activating Influence of Plastic Deformation on Martensite Transformation 20-114-4-25/63

interior stresses in the martensite. There are 4 figures and 8 references, 6 of which are Soviet.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute for Ferrous Metallurgy)

SUBMITTED: February 11, 1957

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APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031700047-6

The Activating Influence of Plastic Deformation on Martensite Transformation 20 114-4-25/63

therefore selected iron-chromium-nickel alloys for the investigations. The composition of the alloys used is given. In the case of both alloys the resistance of the austenite changes inhomogeneously with an increasing degree of deformation. The following was observed at increasing pressure: At first an increase of the intensity of martensite transformation compared to the non-deformed state took place, then the activating influence exercised by deformation became weaker and above a certain pressure the martensite transformation was slowed down. Such a character of the modification of the resistance was observed at 20°, 100°, and 175°C. A deformation of 5% increases the martensite point as well as the amount of martensite considerably. After a deformation by 7,4% the total amount of martensite increases to 20%, and with a further deformation the transformation effects become weaker. After a deformation of 14,7% the effects are already weaker than in the initial state. When annealing at temperatures of up to 400° the resistance of the deformed austenite increases but when annealing beyond 400° the resistance decreases. The activation influence exercised by the deformation seems to be subjected to the occurrence of

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